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EXAMINER

MERCADO, JULIAN A

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 05/16/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application N .

09/836,119

Applicant(s)

LI ET AL.

Examiner

Julian A. Mercado

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-43 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_ 6) ☐ Other: \_\_\_\_.

## **DETAILED ACTION**

### ***Claim Objections***

Claims 5 and 43 are objected to because of the following informalities:

- a. In claim 5 at line 2, it is suggested to insert --consisting-- after "group" in order to recite proper Markush format.
- b. In claim 43 at lines 1-2, it is suggested to delete the indefinite article "a" before "the" (both instances)

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 10, 11, 17, 25 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 10 recites the limitation "the hydroxide-conducting medium" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 11 at line 1, claim 25 at lines 1-1 and claim 26 at lines 1-2 each recite a similar limitation to claim 10 (above) and is thus rejected under the same grounds.

Claim 17 recites the limitation "the electrolyte" in line 1. There is insufficient antecedent basis for this limitation in the claim. It appears to the examiner that "the electrolyte" refers to "the membrane" as recited in claim 1, i.e. the membrane electrolyte.

Claims 25 and 26 recite the limitation "the hydroxide-conducting electrolyte" in lines 1-2 of each claim. For similar reasons as in claim 17 (above), there is insufficient antecedent basis for this limitation in each claim while it appears to the examiner that "the hydroxide-conducting electrolyte" refers to "the hydroxide-conducting membrane" as recited in claim 1, i.e. the hydroxide-conducting membrane electrolyte.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 17, 42 and 43 are rejected under 35 U.S.C. 102(b) as being anticipated by Buehler. (The Production of High Purity Oxygen)

Referring to page 1, third full paragraph and regarding independent claim 1 and dependent claims thereto as noted below, Buehler teaches an electrochemical cell for separating a gas mixture, i.e. impure oxygen, comprising a first and second electrode with an asbestos

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matrix membrane therebetween which is hydroxide conductive. The asbestos matrix has a molecular structure such as its known naturally occurring mineral forms. (applies to dependent claim 2, 17) A DC source biases the cell. (applies to dependent claim 42) Silver wires serve as cell current conductors. (fourth paragraph, applies to dependent claim 43)

Claims 1-3, 17, 18 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Struthers (U.S. Pat. 4,352,864).

The examiner notes that within the scope of this ground of rejection, the preamble recitation of an electrochemical cell “for separating a first gas from a mixture of a gas” has not been given patentable weight, as it is an intended use recitation not otherwise required by the body of the claim. In this regard, regarding independent claim 1 and dependent claims thereto as noted below, Struthers teaches an electrochemical cell having a first and second electrode with a hydroxide-conducting membrane such as polysulfone therebetween. (col. 5 line 30 et seq., applies to dependent claims 2, 3, 17, 18, 35)

Claims 1-3, 17 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Hashizaki. (JP 6-267554)

Hashizaki teaches a fuel cell having a solid polymer electrolyte comprising a first and second electrode, i.e. cathode and anode, having a hydroxide-conducting membrane therebetween. (applies to claims 1, 2, 3, 17, 18)

Claims 1-3, 17, 18, 35, 37-39, 42 and 43 are rejected under 35 U.S.C. 102(b) as being anticipated by Sterzel. (U.S. Pat. 4,828,941)

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Regarding independent claim 1 and dependent claims thereto as noted below, Sterzel teaches an electrochemical cell for separating a gas mixture, i.e. air in order to direct oxygen to the cathode, comprising a first and second electrode with an anion exchange membrane that is hydroxide-conductive such as polyether sulfone, i.e. a polysulfone with an ether moiety. (col. 7 line 59 to col. 8 line 26, applies to dependent claims 2, 3, 17, 18, 35, 39, 41) A DC source biases the cell. (applies to dependent claim 42) A conductor [5] removes the current produced between the first and second electrode. (col. 7 line 62-63, applies to dependent claim 43)

Claims 1-3, 17, 18, 32, 33, 35, 36 and 39-41 are rejected under 35 U.S.C. 102(e) as being anticipated by Yao et al. (U.S. Pat. 6,183,914 B1)

The applied reference has a common assignee and inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Regarding independent claim 1 and dependent claims thereto as noted below, Yao teaches an electrochemical cell for separating a gas mixture, i.e. air in order to direct oxygen to the cathode of a fuel cell or zinc/air cell, comprising a first and second electrode with an anion exchange membrane that is hydroxide-conductive. (col. 2 line 65 et seq., applies to dependent claims 2, 3, 17, 18, 35, 39, 40, 41) The membrane comprises a substrate such as polyester mesh.

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(col. 7 line 51-54, applies to dependent claims 32, 33) The membrane comprises a polymer having quaternary salt functional groups. (col. 5 line 32-50, applies to dependent claim 36)

Claims 1-35 and 37-43 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al. (U.S. Pat. 6,358,651 B1)

The applied reference has a common assignee and inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Regarding independent claim 1 and dependent claims thereto as noted below, Chen teaches an electrochemical cell for separating a gas mixture, i.e. air in order to direct oxygen to the cathode of a fuel cell or zinc/air cell, comprising a first and second electrode with an anion exchange membrane that is hydroxide-conductive and comprising polysulfone, *inter alia*. (col. 9 line 28-38, applies to dependent claim 2, 3, 6, 7, 17, 18, 20, 21, 22, 35, 39, 40, 41) The membrane is cross-linked via methylenebisacrylamide, *inter alia*. (col. 9 line 33-35, applies to dependent claim 4, 5, 12, 13, 14, 19, 27, 28, 29) The membrane comprises a substrate such as polyolefin, *inter alia*. (col. 8 line 67 et seq., applies to dependent claim 8, 9, 23, 24, 32, 33) The hydroxide-conducting medium, i.e. the electrolyte KOH is added prior to polymerization. (col. 10 line 4-20, applies to dependent claim 10, 25) The examiner notes that while this limitation is a process limitation, it has been given patentable weight as the examiner recognizes

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the structural effect of adding the initiator prior to polymerization has on the final structure of the resulting membrane, e.g. incorporation of the electrolyte species in the polymer structure.

However, as to addition of the hydroxide-conducting medium or electrolyte after polymerization, this limitation has not been given patentable weight as the process limitation does not give breadth or scope to the product or article claim. Notwithstanding, Chen teaches adding the hydroxide-conducting medium or electrolyte after polymerization such as in adding additional electrolyte to the cell housing once electrochemical cell employing the membrane is in place.

(col. 10 line 21-29, applies to dependent claim 11, 26) The membrane comprises a polymerization initiator such as ammonium persulfate, *inter alia*. (col. 13 line 28-33, applies to dependent claim 15, 16, 30, 31) A gelling agent, i.e. reinforcing agent such as carboxymethylcellulose or (meth)acrylic acid is employed. (col. 13 line 16-22, Examples 1-6, applies to dependent claim 34) A voltage source and conducting wires are applied across the first and second electrode. (col. 11 line 3-9, applies to dependent claim 42, 43)

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-8, 11- 14, 19-23, 26-29, 32-34, 40 and 41 are rejected under 35 U.S.C. 103(a) as being obvious over Sterzel as applied to claims 1-3, 17, 18, 35, 37-39, 42 and 43 above, in view of Andreola et al. (U.S. Pat. 5,643,968) and Chabreck et al. (U.S. Pat. 6,087,412)



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The teachings of Sterzel are discussed above.

As discussed above, in Sterzel air is the mixture gas while oxygen as shown by the reduction half-equation is the first gas. (now applicable to dependent claim 40, 41) As to an electrolyte within the membrane medium, Sterzel specifically discloses that these membranes must be maintained in a moist state; water itself within the scope of claim 34 is considered to read on the instant electrolyte. (col. 1 line 66-68, applies to dependent claim 34) As above, the examiner notes that the limitation "the hydroxide-conducting medium is added after polymerization" has not been given patentable weight as this process limitation does not give breadth or scope to the product or article claim nor does it appear to effect the final product. Notwithstanding, maintaining the hydroxide-conducting medium, i.e. the membrane moist by adding water is done after polymerization of the formed membrane once it is assembled into the cell. (applies to dependent claim 11, 26)

Sterzel does not explicitly teach the polymeric structure of the polysulfone to comprise a monomer of water soluble ethylenically unsaturated amides and acids with the polymeric structure being cross-linked, however, Andreola et al. teaches vinylsulfonic acid co-polymerized with polysulfone and facilitated by a crosslinking or gelling agent. (col. 3 line 23-65, col. 8 line 32 et seq., applies to dependent claims 4, 5, 6, 7, 12, 13, 19, 20, 21, 22, 27, 28, 34) The copolymerization may be formed on a substrate such as coating onto hollow fibers or tubes of porous supports. (col. 9 line 21-23, applies to dependent claim 8, 23, 32, 33) Thus, at the time the invention was made, the skilled artisan would find obvious to modify Sterzel's invention by employing polysulfone cross-linked with vinylsulfonic acid for reasons such as achieving a membrane having a high degree of selectivity in separation processes.

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As to sodium vinylsulfonic acid or the cross-linking agent being methylenebisacrylamide, *inter alia*, Chabreck is relied upon to specifically demonstrate mutual equivalence between vinylsulfonic acid and its corresponding salt, (col. 18 line 34 et seq.) thus, sodium vinylsulfonate would be an obvious substitution to the skilled artisan for vinylsulfonic acid in recognition of either copolymer matching the function, way, and result of the other, absent of unexpected results. A similar analysis of mutual equivalence is applied to the extent that Chabreck teaches methylenebisacrylamide as both a cross-linking and grafting agent which is found consistent with Andreola's characterization of cross-linking or graft polymerization agents being added to the polymerization of vinylsulfonic acid with polysulfone. (col. 22 line 63 et seq. of Chabreck, applies to dependent claim 14, 29)

Claims 15, 16, 30 and 31 are rejected under 35 U.S.C. 103(a) as being obvious over Sterzel, Andreola et al. and Chabreck et al. as applied to claims 1-8, 11-14, 17-23, 26-29, 32-35 and 37-43 above, in view of Itoh et al.

The teachings of Sterzel, Andreola and Chabreck are discussed above.


While Sterzel does not explicitly teach a polymerization initiator, Itoh is relied upon to teach a polymerization initiator such as an alkali metal persulfate, e.g. potassium persulfate. (Example 1, applies to dependent claim 15, 16, 30, 31) Thus, the skilled artisan would find obvious to further modify Sterzel's invention by employing potassium persulfate during the polymerization for reasons such as initiating the onset of acrylic, vinyl and other resin polymerization reactions.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julian A. Mercado whose telephone number is (703) 305-0511. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (703) 308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

 **Julian A. Mercado**  
May 9, 2003

  
**Patrick Ryan**  
Supervisory Patent Examiner  
Technology Center 1700